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EXTENDABLE MOUTH STYLUS**CROSS-REFERENCE TO RELATED APPLICATIONS**

This application claims benefit of priority from Provisional U.S. Patent application Ser. No. 61/765,532, filed Feb. 15, 2013, the contents of which are incorporated by reference.

BACKGROUND**1. Field of the Invention**

The present invention is generally related to mouth styli and more particularly related to an electronically or mechanically extendable mouth stylus.

2. Related Art

Mouth Styli designed to allow quadriplegic and tetraplegic patients to interact with touch screen devices are commercially available. To use a mouth stylus, the stylus is placed in an individual's mouth and is used to point and interact with the touch sensitive device by pressing on the icon controls.

However, commercially available mouth styli are of fixed length as shown in FIG. 1. The fixed length of existing mouth styli can create problems for paralyzed individuals who must move their head to compensate for changes in length between the head/mouth and the touch sensitive device.

Therefore, there is a need for a mouth stylus that may overcome this problem found in the conventional systems described above. Thus, to address this problem, a mouth stylus may need to change length to help quadriplegic and tetraplegic patients interact with the touch screen device.

SUMMARY

A general purpose of a mouth stylus device is to allow someone who is unable to use his or her limbs to operate a touch sensitive device. Various embodiments of a mouth stylus having an extendable portion are described herein. Some embodiments are purely mechanical allowing a user to actuate a spring or lever with at least one of their mouth, teeth, or tongue to extend and retract the stylus. Though mechanical embodiments can be operated successfully, some also may cause potential discomfort for individuals. Thus, some embodiments use a motor controlled by a user to vary the length of the stylus through the application of force to the mouthpiece or articulation of a lever integrated into the mouth piece with the tongue, teeth or jaw.

A solution described herein may also include a mechanically actuated mouth stylus designed to be used with both capacitive and resistive touch screens by users who are unable to control their limbs. In some embodiments, the mechanically actuated mouth stylus includes a movable portion linearly coupled to a stationary portion by a spring loaded locking mechanism. In some embodiments, the locking mechanism is mechanically coupled to a spring loaded mouthpiece assembly such that applying bite pressure to the mouthpiece assembly causes the locking mechanism to release allowing the moveable portion to move relative to the stationary portion by application of either gravity or blowing pressure.

A solution described herein may also include an electromechanically actuated mouth stylus, designed to enable the use of both capacitive and resistive touch screens by users who are unable to control their limbs. In some embodiments,

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an electromechanically actuated mouth stylus uses a small direct current (DC) motor coupled to a linear actuator. In some embodiments, an electromechanically actuated mouth stylus uses a DC motor coupled to a spool of string to compress or release a linear spring and retract or extend a plurality of telescoping pieces. In some embodiments, applying pressure to either the left or right side of the mouthpiece using the jaw controls the shaft extension and retraction. For instance, lengthening is achieved by applying higher pressure to the right side of the mouthpiece while shortening is achieved by applying higher pressure to the left side of the mouthpiece. In some embodiments, the tip of the device is covered in a conductive plastic or rubber to enable use on capacitive touch screens. An electromechanically actuated device may provide greater controllability and pressure when touching the screen compared to a purely mechanical device that could be actuated using the tongue or pneumatic pressure from the lungs. However, an electromechanically actuated embodiment need not provide greater control or pressure application compared to a purely mechanical embodiment.

Other features and advantages of the present invention will become more readily apparent to those of ordinary skill in the art after reviewing the following detailed description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The structure and operation of the present invention will be understood from a review of the following detailed description and the accompanying drawings in which like reference numerals refer to like parts and in which:

FIG. 1 illustrates a prior art mouth stylus;

FIG. 2 is a plan view diagram illustrating a first example extendable mouth stylus according to an embodiment of the invention;

FIG. 3 is a top view diagram according to a second example embodiment of an extendable mouth stylus in a non-extended state;

FIG. 4 is a side view diagram according to the second example embodiment of the extendable mouth stylus in the non-extended state;

FIG. 5 is a perspective view diagram according to the second example embodiment of the extendable mouth stylus in the non-extended state

FIG. 6 is a top view diagram according to the second example embodiment of the extendable mouth stylus in an extended state;

FIG. 7 is a side view diagram according to the second example embodiment of the extendable mouth stylus in the extended state;

FIG. 8 is a perspective view diagram according to the second example embodiment of the extendable mouth stylus in the extended state.

FIG. 9 is a top view diagram according to a third example embodiment of the extendable mouth stylus.

FIG. 10 is a perspective view diagram according to a fourth example embodiment of the extendable mouth stylus.

FIG. 11 is an enlarged portion of a locking mechanism according to the fourth example embodiment of the extendable mouth stylus.

FIG. 12 is an enlarged portion of a mouthpiece assembly according to the fourth example embodiment of the extendable mouth stylus.

FIG. 13 is a perspective, front view diagram of a user using an embodiment of the extendable mouth stylus.